DOCUMENT RESUME

ED 330 293 HE 024 381

TITLE	Graduate Students from Developing Countries in U.S. Science Departments. A Handbook for Department Chairs and Faculty Members.
INSTITUTION	American Association for the Advancement of Science, Washington, D.C.; National Association for Foreign Student Affairs, Washington, D.C.
SPONS AGENCY	Agency for International Development (IDCA), Washington, DC.
REPORT NO	AAAS-83-15
PUB DATE	83
NOTE	25p.
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Academic Advising; Admission Criteria; Career Guidance; *Developing Nations; Educational Background; *Faculty Advisers; *Foreign Students; *Graduate Students; Higher Education; Science Departments; *Science Education

ABSTRACT

This guide is intended to assist college faculty members working with graduate students from developing nations who may need help bridging the gap between their educational backgrounds and the requirements of graduate science programs which are primarily planned for U.S. students. Differences are noted in the pre-graduate school training of such foreign students including a highly specialized and theoretical training with heavy dependance on rote memorization and little experience with problem solving and practical laboratory skills. Since foreign students returning to their countries will most likely have to function as scientists, teachers, and managers, a broadened education including courses in business and management, summer seminars expressly for foreign graduate students, and continued professional contacts with their academic advisors are among the suggestions offered. These topics are addressed in several sections titled: "Selection"; "Communication with Admitted Students"; "Selection of Advisors: A Note to Department Chairmen"; "Some Cross-Cultural Considerations of Foreign Students: A Note to Advisors"; "Practical Training"; and "Preparation for Careers in Science in Developing Countries." Includes 29 References. (JB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Graduate Students from Developing Countries in U.S. Science Departments

A Handbook for Department Chairs and Faculty Members

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

NAFSA

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

The American Association for the Advancement of Science (AAAS), founded in 1848, is the world's largest federation of scientific organizations, with some 140,000 individual members and 286 affiliates, including all of the major scientific societies in the United States and most of the local academies of science. AAAS publishes Science, the weekly journal of science, and Science 83, the monthly magazine of popular science. AAAS also conducts a variety of projects to advance science and human progress.

The National Association for Foreign Student Affairs (NAFSA) is a nonprofit membership association that provides training, information, and other educational services to professionals in the field of international educational exchange. The membership is composed of more than 4,500 representatives of postsecondary institutions, school systems, community organizations, and educational associations. Members implement association programs and participate in the determination of policies and activities through the Board of Directors and more than 35 committees, commissions, and special interest groups.

Additional funding for this publication was provided by
the NAFSA/AID Program
Washington, D.C. 1983
AAAS Publication # 83-15

Copyright 1983 by the American Association for the Advancement of Science. All rights reserved. Printed in the United States of America.

CONTENTS

	Page
Foreword	1
Introduction	3
Selection	5
Communication with Admitted Students	7
Selection of Advisors: A Note to Department Chairmen	8
Some Cross-Cultural Considerations of Foreign Students: A Note to Advisors	9
Practical Training	14
Preparation for Careers in Science in Developing Countries	15
Epilogue	17
Selected Bibliography	18

FOREWORD

This handbook was developed jointly by the American Association for the Advancement of Science (AAAS) and the National Association for Foreign Student Affairs (NAFSA). Its publication is made possible under the terms of a grant to NAFSA by the U.S. Agency for International Development (AID). It is a revised and expanded version of an earlier brochure developed as a result of a symposium entitled "Strategies in Graduate Education in Science and Technology for International Development," held at the 1979 AAAS Annual Meeting. The encouraging response to the earlier version indicated that the brochure answered a real need.

Preparation and revision of the text was the work of: Charles V. Kidd, Research Professor for Science Policy, George Washington University; Michael J. Moravcsik, Professor of Physics, University of Oregon; Willis Griffin, Director, Office of International Programs,

BEST COPY AVAILABLE

University of Kentucky; Robert Mashburn, Director, NAFSA/AID Program; Denise Weiner, Senior Program Associate, Office of International Science, AAAS; Valerie Woolston, Director, Office of International Educational Services, University of Maryland.

The following individuals assisted AAAS and NAFSA in the review: Robert C. Brasted, Professor of Chemistry, University of Minnesota; H. Douglass Gross, Professor of Crop Science, School of Agriculture and Life Sciences, North Carolina State University; J. William McGowan, Department of Physics, University of Western Ontario; Jeana McKinney, Assistant Coordinator of International Programs, North Carolina State University; Robert P. Morgan, Professor, Department of Technology and Human Affairs, Washington University; Parvaiz A. Naim, Graduate Student (from Pakistan), Department of Botany, Iowa State University; Michael J. Pelczar, Jr., The Council of Graduate Schools in the United States; Donald Roberts, Foreign Student Advisor, North Carolina State University; Sachi Sri Kantha, Graduate Student (from Sri Lanka), College of Agriculture, University of Illinois at Urbana-Champaign.

INTRODUCTION

This handbook is intended for science departments in United States colleges and universities which have or may have foreign graduate students from so-called "Third World" or "developing" countries. It deals primarily with questions relevant to the academic training of those students and their relationships with their departments and academic advisors before, during and after their stay in the U.S.

Developing countries differ substantially from the United States in history, culture, social institutions, economic status and technological development. They also differ among themselves, in ways that often make it inappropriate to identify them as a group. Nevertheless, students from these countries tend to share certain characteristics which pose educational challenges not fully considered in the provisions made for United States students in higher education. These shared characteristics as well as individual differences result in special needs that demand attention. These special needs and how they may be more adequately met by science departments are the subjects of this publication.

Students from developing countries need assistance to help bridge the gap between their educational backgrounds and those of United States students for whom graduate science programs are primarily

planned, as well as to prepare them better for the tasks awaiting them. Most of these students will return home to take up or continue responsibilities related to the development of their countries. The social, cultural and economic situation each will face on return should be kept in mind by students and academic advisors alike.

Although most colleges and universities with students from developing countries have given some thought to the special needs of these students (see selected bibliography p. 18), few institutions have fully explored ways to make study in the United States more relevant to the needs of the countries from which they come. Because the sciences are considered to be less culture-bound and more universal than many other disciplines and professional areas of study, some science faculty members may have given less thought than others to possible alternatives and special provisions for foreign students from developing countries; they may find this publication particularly helpful.

Increasingly, however, sponsors of students and the students themselves are examining graduate programs more carefully for relevance to the needs and realities of the developing world. During the past several years, similar second thoughts among United States university personnel and exchange organizations with experience in the developing world have led to conferences, publications, research and experimentation on the question of academic relevance (see bibliography). Although the need for program adjustments in the sciences may be less than that in other areas of study, there are

nevertheless alternatives in the sciences that should be considered. While it is generally agreed that the basic curricula should not be altered, complementary ways through which to meet the special needs of students from developing countries are suggested.

SELECTION

1. Evaluation of credentials

The evaluation of credentials of applicants from developing countries is often a time-consuming and complex task. Close cooperation and coordination between the admissions office and the academic department are essential before a final decision is made.

In addition to having a clear picture of the academic achievement of the applicant and identifying professors within departments to guide appropriate research, it is necessary to assess the financial resources and the English proficiency of the applicant. If professional experience was acquired in the home country, it should be taken into account during the admission process.

2. Standardized examinations.

General university criteria and academic departmental criteria must be met by applicants for admission. In some cases, standardized examinations might be waived if sufficient alternate information is available. Standardized exams, such as the Graduate Record Examination (GRE), were formulated with the U.S. applicant in mind, and without

provision for the many foreign students who have no experience with gridsheets or the multiple answer format. Though the quantitative results may indicate much about the applicant's ability, the results of the qualitative sections are less dependable for applicants from other cultures. Standardized exams are not reliable as sole indicators of the academic potential of a student; results should be used with caution and in combination with all other available credentials.

Similarly there are circumstances in which it is appropriate to waive an English proficiency examination: if an applicant's education in the home country has been completed entirely in English and the applicant has strong results from good schools; if the applicant has obtained a tertiary degree in the U.S. or in another English-speaking country. An academic admission decision should never be made solely on the basis of an English language proficiency examination.

Standardized examinations are expensive and difficult to schedule in certain developing countries. It may be difficult to obtain the foreign currency exchange permit needed in order to register for the tests. In addition to academic credentials, detailed letters of recommendation and statements of intent should be received, in order to make as careful and complete an assessment of the applicant as possible, and to make an informed and responsible decision.

3. Interview Programs

An additional way of evaluating a student's background and preparedness for graduate study in science is the personal interview. Very economical programs have been organized to interview students in

their home countries. Information on applicants obtained through these interviews is then forwarded to participating departments in the U.S. For information on two such programs, contact:

in Physics:

Professor M.J. Moravcsik
Institute of Theoretical Science
University of Oregon
Eugene, OR 97403

in Chemistry:

Professor G. Wilson
Department of Chemistry
University of Arizona
Tucson, AZ 85721

COMMUNICATION WITH ADMITTED STUDENTS

Provision of timely and precise information to newly admitted foreign graduate students will both reduce the load on university staff and ease the transition for the students. Each department should communicate with newly admitted foreign graduate students soon after the decision to admit has been made. This should be coordinated with the Graduate Admissions Office and the campus Foreign Student Services Office.

The letter should cover all necessary information pertaining to the department, including: formal notification of admission; special advice on the timing of arrival (such as advice to arrive in time to take a special English or mathematics course if needed); notice of financial support or assistantship if such a decision has been made; the name, address and phone number of: i) the departmental foreign graduate student advisor, if known; ii) the campus foreign student advisor; any other information needed by each individual student. In addition, foreign students should be advised to secure information on employment at home before departing for the United States.

SELECTION OF ADVISORS:
A NOTE TO DEPARTMENT CHAIRMEN

A foreign student's success can be greatly enhanced through contact with an understanding, knowledgeable, and energetic academic advisor, who is willing to spend time talking with foreign students. The most constructive action that a departmental chairman can take is to encourage faculty members with these qualifications to advise foreign students in the department.

Science departments often have faculty members with some personal experience in the developing world: they might be invited to counsel the students from developing countries, formally or informally. It may be advisable to appoint one faculty member in the department as the

overall advising coordinator and troubleshooter for foreign graduate students. Academic advisors should be reminded that the scientific societies to which they belong may have international activities of interest to foreign students.

SOME CROSS-CULTURAL CONSIDERATIONS OF FOREIGN STUDENTS

A NOTE TO ADVISORS

A few generalizations about foreign students, although stereotypical, may be useful as examples of some of the differences in attitudes and values between Americans and some foreign students.

Communication

Since many foreign students are unaccustomed to approaching their academic advisor with problems or questions, the advisor must take the initiative, at least in the first year, and help students overcome initial difficulties in communication.

Bargaining

Students from some countries accept bargaining for grades as a routine practice. Early discussion of our custom on this point can help relations between faculty and foreign students before problems occur.

Rote Learning and the Need for Introductory Courses

Many foreign students may look down upon our introductory graduate courses as something "they have had" at home. In many cases, their

contact with such courses was purely formalistic and their learning was by rote. They may therefore be unable to solve problems in scientific subjects, not only on the level of graduate courses, but even on an undergraduate level. Unless there is concrete evidence to the contrary, incoming foreign graduate students should be strongly advised to take, in the first year, a very basic load, even including undergraduate courses, so they can learn how to solve problems, a process that is basic to American science education. The students may strongly resist being put into such "low" courses, and hence the academic advisor must be particularly persistent and convincing; starting a graduate education with gaps at the undergraduate level is a defect that is very difficult to overcome. It is important to evaluate carefully prior study in deciding which introductory courses (if any) are needed. Perhaps the final decision on course requirements should be made after a thorough discussion with the student on arrival.

Preference for Theory

Many foreign students will have had only "theoretical" (i.e. formal) education, and no experience in problem-solving or laboratory work. They will, in many cases, also express a preference for the theoretical aspects of the sciences as opposed to experimental work. This preference is rooted both in the values that they have been taught and in the content of their education. Many foreign graduate students will therefore try to concentrate on theoretical studies and resist learning technical or manual skills that they consider beneath their ability.

The academic advisor should explain why these skills make better scientists and how they will be of value upon returning home. The advisor should do everything possible to see that the students are exposed to laboratory experience, electronics, glass blowing, and similar practical skills.

Premature Specialization

Many foreign students will have already "specialized" into a narrow subfield by the time they arrive. If they have not, they will often wish to acquire a narrow specialization in the United States and may resist taking courses outside this speciality in order to finish sooner, and also because they are psychologically used to being on a "higher" (i.e. more specialized) level. In reality, it is even more important for a foreign graduate student than for an American student to have a broadly-based science education: a primary function of a scientist in a developing country is to serve as a funnel and receptor for new scientific results produced around the world. Breadth of knowledge and interest are crucial in order to fulfill this role.

One important reason for the limited interaction between science and technology in many developing countries is the narrow specialization of students and researchers (often, curiously, brought about by a desire to be "applied"). Such narrow specialization may reduce a student's ability to adapt to the basic or applied research problems that arise. The academic advisor, therefore, should stress the value to foreign students of becoming acquainted with a broad variety of areas within the particular scientific discipline or perhaps

even outside it.

Field of Research

There is virtually unanimous agreement among educators that the graduate study of foreign students should be as broad, current, challenging, and as original in subject as that expected of American students. After all, the aim of research training is to enable the student to think, and solve new problems.

It is equally important, however, that the choice of courses, the work as a research assistant, and the thesis topic take into account, if at all possible, what research can be done by the scientist upon returning to the home country. Some types of research, requiring very expensive apparatus, are impossible to pursue in a developing country, and students should be made aware of this fact. Some rapidly advancing fields require direct and extensive communication channels without which the researcher may be handicapped. On the other hand, research topics in fields such as earth and biological sciences may be particularly adapted to the specific biological environment of a developing country.

Field work in a developing country should be encouraged, provided funds are available and adequate supervision can be sustained. Such field investigations might be incorporated into a joint program combining research done both in the U.S. and in the home country. If there are already researchers in a given field working in the home country, the newly returned researcher will be able to find more cooperation and will contribute to the formation of a "critical mass"

of colleagues in that field. This critical mass need not be limited to one sub-discipline, but may extend to related fields of research.

It is important to impress on students that their thesis research areas may not necessarily be the ones in which they will work throughout their career. Researchers with a flexible attitude are more likely to be able to take advantage of whatever research opportunities exist in developing countries and, therefore, to avoid frustration.

Jobs Back Home

Foreign graduate students should be urged, long before they receive their degree, to begin looking for a position at home. Even when the opportunity to "postdoc" is available, initial overtures for getting a position at home should be made while in graduate school if not before. The task is usually much more arduous in a developing country, where bureaucratic restrictions and delays are common and the sense of urgency is often absent. The personal contacts of the department's faculty members with scientists in developing countries should be utilized (see ref. 16).

"Brain drain" may be considerably reduced if students receive while in the U.S. some complementary education to prepare them better for the environment to which they are to return; if assistance is provided in their search for a position back home; and if efforts are made by the research advisor to maintain contact with them after they leave.

BEST COPY AVAILABLE

PRACTICAL TRAINING

A comprehensive study completed in 1980 (ref. 19) of the needs of students from developing countries studying in the United States revealed that, among those investigated, the need least satisfied by educational programs was for practical training while in the United States.

Practical training is both academic and professional/vocational. A graduate research assistantship is an example of a practical training experience in an academic setting that integrates theory and practice. In each practical training situation, whether in the university or in private business, the combination of "doing" with prior, concurrent, and possibly future, classroom learning, results in a truly comprehensive education for the student trainee. When possible, summer job opportunities should be sought either in the U.S. or in the home country.

Practical training is a valuable and integral part of the total educational experience and should not be considered an educational luxury or an "add-on" even though it may involve additional time and, in some cases, expense. It is essential, of course, that practical training (including its financial implications) be well planned, as early as possible by all parties involved. Planning for practical training must be made in accordance with the legal requirements that currently govern students holding the F-1, M-1, and the J-1 visa

classifications. Guidance on federal immigration regulations can usually be obtained from the office of the Foreign Student Adviser on campus.

PREPARATION FOR CAREERS IN SCIENCE IN DEVELOPING COUNTRIES

Need for Complementary Education

A graduate student from a developing country, upon returning home, will most likely have to function as a scientist, a teacher, and a manager in order to create the circumstances under which science can be done. Any experience and material pertaining to the building of such a scientific infrastructure should be made available. The academic advisor can be of great assistance to foreign students by encouraging them to broaden their education through contacts with appropriate faculty members or by informing them of other organized programs or courses at the university. For example, courses in business and management, or development economics, can be beneficial.

Summer seminars for foreign students offered by a number of American university departments constitute another way of filling this need. The subjects which can be covered in such auxiliary education range from very practical skills (e.g. glass blowing, how to order from a catalog, use of library resources) to more general knowledge (e.g. the methodology of science, science policy, procedures for funding

research, interaction between science and technology, science and technology management for development, the workings of a university or research institution, etc.).

Such courses may be offered by scientific societies; for example, the American Physical Society held in July 1983 a two-week "Summer Seminar Designed to Strengthen Organizational Skills of Physicists Returning to Developing Asian Countries."

Advisors can secure information on such courses by writing to NAFSA, AAAS or their professional societies.

Post-Educational Contact

Former students, as new Ph.D.'s, will benefit from continued contact with their academic advisors. Especially in the relatively isolated location of their home countries, they may come to rely on their advisors as one of their very few channels to the worldwide scientific community. They may be handicapped by a lack of current journals and reports; the absence of collegiate and professional visitors; the difficulties in attending conferences, and other otherwise paricipating in the network of scientific communication. Bilateral programs of the U.S. National Science Foundation, the Agency for International Development, the U.S. Information Agency, and other agencies, may be available to assist in maintaining such contacts. Some professional societies have, or may institute in the future, special membership rates and services for foreign members.

It is essential that former students spend a few months or a year working in active scientific centers to keep abreast of the most recent

developments in their field. Many faculty members have opportunities to support such efforts on research grants and should be encouraged to do so. Others have the opportunity to travel and could visit former students and lecture in developing countries. To further this contact and scientific exchange, some professional societies and universities have established lecture bureaus which try to match requests for lectures with members of the profession who are traveling on sabbatical, or attending seminars, in developing countries.

EPILOGUE

Students from developing countries admittedly represent a special challenge in education. They also represent a special potential: most American students are unlikely to encounter the types of opportunities and acquire the degree of leverage some foreign students may acquire in their own countries where they will be among the very few in their fields. Dealing with scientists from other countries exposes American teachers and students alike to the way science is conducted elsewhere and might encourage them to visit some of those countries. Such contacts can open very exciting new horizons; they foster better communication and understanding, and contribute to the advancement of science.

Selected Bibliography

The following volumes may provide useful information to advisors of foreign students.

1. Baron, Marvin J. (ed). Advising, Counseling, and Helping the Foreign Student. National Association for Foreign Student Affairs, Washington, D.C., 1975.

2. Baron, Marvin J. The Relevance of U.S. Graduate Programs to Foreign Students from Developing Countries. National Association for Foreign Student Affairs, Washington, D.C., 1979.

3. Boyan, Douglas R. (ed.). Profiles - The Foreign Student in the United States, Institute of International Education, New York, 1981.

4. Brasted, Robert C. (ed.). Guide to Chemical Education in the U.S. for Foreign Students. Committee on International Activities, American Chemical Society, Washington, D.C., 1981 (aimed at prospective foreign students).

5. Carnoy, Martin and Harry Levin. The Limits of Educational Reform. David McKay Co., New York, 1976.

6. Focus of Physics on Science and Technology for Development, American Physical Society, Report of a workshop held in Boddeck, Nova Scotia, Canada, October 16-19, 1980.

7. Foreign Participation in U.S. Science and Engineering Higher Education and Labor Markets, National Science Foundation, Special Report, NSF 81-316, Washington, D.C., 1981.

8. The Foreign Student in American Graduate Schools. Committee on International Graduate Study, Council of Graduate Schools in the United States, Washington, D.C., 1980.

9. Foreign Students and Institutional Policy - Toward an Agenda for Action. A Report of the Committee on Foreign Students and Institutional Policy, American Council on Education, Washington, D.C., 1982.

10. Goetzl, Sylvia and Jill D. Stritter (eds.). Foreign Alumni: Overseas Links for U.S. Institutions. National Association for Foreign Student Affairs, Washington, D.C., 1980.

11. Goodwin, Crawford D. and Michael Nacht. Absence of Decision - Foreign Students in American Colleges and Universities, Institute of International Education, Research Report No. 1, New York, 1983.

12. Handbook for Academic Advisors of Foreign Students, International Students Committee, University of Kentucky, 1982.

13. Hood, Mary Ann G. and Kevin Schieffer (eds.). Professional Integration: A Guide for Students from the Developing World. National Association for Foreign Student Affairs, Washington, D.C., 1983.

14. Hull, W. Frank, IV. Foreign Students in the United States of America, Praeger Publishers, New York, 1978.

15. Jenkins, Hugh M. (rapporteur). The Relevance of U.S. Education to Students from Developing Countries: A Report on the Fourth AID/NAFSA Workshop. National Association for Foreign Student Affairs, Washington, D.C., 1980.

16. Jenkins, Hugh M., (ed.) The Role of The Foreign Student in the Process of Development. National Association for Foreign Student Affairs, Washington, D.C., 1983.

17. Keeton, Morris T. and Associates. Experimental Learning. Jossey-Bass, San Francisco, 1976.

18. Knowles, Asa S. and Associates. Handbook of Cooperative Education. Jossey-Bass, San Francisco, 1971.

19. Lee, Motoko Y. Needs of Foreign Students from Developing Nations at U.S. Colleges and Universities. National Association for Foreign Student Affairs, Washington, D.C., 1981.

20. Moravcsik, Michael J. and J.M. Ziman. "Paradisia and Dominatia: Science and The Developing World." Foreign Affairs, 53(4): 699-724, 1975.

21. Morgan, Robert P. Science and Technology for Development: The Role of U.S. Universities (Pergamon Policy Studies, No. 38). Pergamon Press, New York, 1979.

22. Principles for Practical Training Experiences for Foreign Students. National Association for Foreign Student Affairs, Washington, D.C., 1982.

23. Proceedings of the Global Seminar on the Role of Scientific and Engineering Societies in Development (New Delhi, December 1-5, 1980). The Indian National Science Academy, New Delhi, 1982.

24. Resources for Practical Training. National Association for Foreign Student Affairs, Washington, D.C., 1983.

25. Smith, Eugene H. and Marvin Baron. Faculty Member's Guide to U.S. Immigration Law. National Association for Foreign Student Affairs, Washington, D.C., 1980.

26. Szmant, H. Harry. "Foreign Aid Support of Science and Economic Growth." Science, 199: 1173-1182, March 17, 1978.

27. Wedel, Jeannette, (ed.). The Role of Scientific and Engineering Societies in Development (Proceedings of a Workshop conducted by the American Association for the Advancement of Science for the U.S. Department of State, Washington, D.C., May 21-22, 1979). American Association for the Advancement of Science, Washington, D.C., 1979.

28. Weiss, Charles, Jr. "Mobilizing Technology for Developing Countries." Science, 203: 1083-1089, March 16, 1979.

29. Wilson, James W. "Criteria for the Evaluation of Cooperative Education Programs." The Journal of Cooperative Education. 16(3): 99-105, 1980.

Information and help in the field of foreign student advising, admissions procedures, immigration regulations, etc., can be obtained from the National Association for Foreign Student Affairs (NAFSA), 1860 19th Street, N.W. Washington, D.C. 20009. Numerous publications are readily available. In addition, NAFSA operates an employment locator service, the Home Country Employment Registry.